

## ON THE SPECIES OF MEGALOPTA DESCRIBED BY F. SMITH (HYMENOPTERA, APOIDEA)

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The genus *Megalopta* F. Smith has a quite deceptive history when one considers the way it has been interpreted by subsequent authors. Even F. Smith included in it various unrelated Halictinae whose positions are indicated below.

The most important error was made by Cockerell in 1900 when he designated *Megalopta bituberculata* as the type of the genus. It is further strange that Sandhouse (1943), when listing this species as the type, cited Meade-Waldo (1916, Ann. Mag. Nat. Hist., (8) 17: 451) as the author who made the designation. Actually, Cockerell (1900, Proc. Acad. Nat. Sci. Philadelphia, p. 374) could hardly have been more categorical. He said, "*M. bituberculata* Smith is to be regarded as the type of *Megalopta*."

As I have already stated in another paper, Cockerell's designation is not in accord with Smith's diagnosis, which refers clearly to the female, although *bituberculata* was described from the male. This can be shown also by reference to figures 13 and 14 of Smith's plate III. The antennae have twelve segments and the drawing of the labrum shows a configuration that could only be a female. The labrum is also minutely described in Smith's generic description and attention is called to the longitudinal carina, broadened basally, a character of females. The drawing of the wing undoubtedly corresponds to *M. bituberculata*, as shown by the position of the first m-cu considerably anterior to the apex of the second submarginal cell. However, in the description the reference is evidently to the type of wing of *M. idalia*. Moreover, the name, and the indication of large ocelli in the description, are only applicable to *M. idalia*.

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For the reasons indicated above, I have no doubt whatever that *M. idalia* is automatically the type species of the genus, in spite of the earlier designations of *bituberculata*. This was also the viewpoint of Ducke, to whom I referred previously [Moure, 1943, Rev. Ent. (Rio de Janeiro), 14: 480-481].

My *Tmetocoelia*, with *Megalopta sulciventris* Friese as the type, is a synonym of *Megalopta* as here interpreted. When I erected this genus, I did so on the basis of Meade-Waldo's key (1916) which stated that the third sternite of *M. idalia* is normal or almost normal. Actually, in *M. idalia*, it is profoundly bilobed, with a deep notch between the lobes.

Equally, *Megaloptella* Schrottky, 1906, having as type *Halictus ochrias* Vachal, is a synonym of *Megalopta*. As the male of *M. idalia* runs exactly to *H. ochrias* in Vachal's key, it is probably the same species or at least a very close one.

*Megaloptidia* Cockerell, 1900, is a good group (genus or subgenus) among the Megaloptas. I had an opportunity to study the type species in the Carnegie Museum, Pittsburgh, and made the following notes (type number 345):

General aspect as in *Megommation*, differing principally as follows: Sternites 1 to 3 with normal, weakly recurved, margins, fourth bilobed with profound median notch and the resulting lobes quite pilose, fifth membranous and normal with the margin practically straight, sixth truncate—bilobed with the notch very superficial. The labrum has the apical angle obtuse, almost right angular, and is strongly bowed in the basal two thirds, without a median carina, broader than long (22:16). The supra-clypeal area is broader medially than the upper part of the clypeus, because of the outward curvature of the subantennal sutures which narrow the paraocular areas. The frontal line is cariniform, confined to the interantennal elevation, without entering on the frons proper. The wings are rather notably pilose, the pterostigma four times longer than broad (58:14) and the prestigma a little longer than width of pterostigma (18:14); the marginal cell is quite elongate and tapering in the free part, four times as long as broad (128:30), and the apical free part almost twice as long as basal part occupied by the submarginal cells (90:40); distance to wing tip, taken from a line perpendicular to apex of cell, about a third of length of cell (44:128); first submarginal cell longer than the two following

together (proportions on vein M 60:18:34); second submarginal cell smaller, higher than long and receiving first m-cu at its apex; hamuli 10 on each wing.

I was able to find in the Hope Museum, Oxford University, the type of *Halictus insignis*. This species was designated as the type of *Megommation*. The specimens on which I based the generic description are conspecific with the type, and also with material of *Megalopta (Megaloptella) ipomoeae* Schrottky, whose synonymy I can now confirm. It is noteworthy that Bates refers to nesting of *Megalopta ianthina* Smith in branches of trees while nests of *Megommation insigne* (Smith) in the soil were found by C. D. Michener and R. B. Lange.

*Ariphanarthra* continues as an aberrant group of Megaloptas, distinguished by highly specialized characters, especially the greatly elongated palpi to which I called attention in my paper of 1951 (*Dusenias*, 2: 139).

Considering the species described by Smith, the following descriptions and comments show present generic positions, as well as some new synonymy. New generic and subgeneric names are proposed for two of them, *M. bituberculata* and *M. ornata*.

#### 1. *Megalopta idalia* Smith, 1853

Type female: 17.a.1276. British Museum.

SIZE: Length 11.20 mm.; wing, including tegula, 9.20 mm.; head and abdominal widths 2.85 mm. and 3.80 mm.

Basal area of propodeum a little shorter than metanotum, smooth, limited by a very thin, delicate carina. Eye length more than twice upper interorbital distance, and this less than lower interorbital distance (112:51:69 and maximum interorbital distance 80)<sup>2</sup>; interocellar distance almost four times ocellocular distance and slightly longer than transverse diameter of median ocellus (19:5:17); ocelloccipital distance almost equal to interocellar, but a little shorter than orbitocipital distance as measured in dorsal view (20:19:23); clypeal length almost half of clypeocellar distance (42:78); interalveolar<sup>3</sup> distance shorter than alveolorbital (13:18), but alveolocellar as long as subantennal suture (35:35); proportional lengths of scape, pedicel and four basal segments of flagellum as 65:8:10:8:11:12 and maximum diameter of flagellum 12.

Type locality: Santarém, Pará, Brasil (53/60).

<sup>2</sup> All the measurements were made with 50 times magnification, and 1 division of the micrometric ocular corresponds actually to 20 microns ( $\mu$ ), or if multiplied by 0.02, to millimeters.

<sup>3</sup> The alveoli concerned are the antennal sockets.

2. *Megalopta purpurata* Smith, 1879.

Type male, 17.a.1273. British Museum.

SIZE: Length 13.40 mm.; wing, including tegula, 12.60 mm.; head and abdominal widths 3.58 mm. and 3.60 mm.

Brown-ferruginous, with some metallic bronze reflections on head, sides of mesoscutum, scutellum, episterna and propodeum. Pubescence long and fuscous, but pale on genae, propodeum, and ventral side. Propodeum bowed, with a short (less than half length of metanotum), shining, shallowly micro-reticulate basal area. Third sternite deeply notched, bilobate, the notch deeper on fourth sternite, at its bottom with a strong, almost perpendicularly raised spine and lobes projected in a point backwards and with outer sides emarginate; fifth sternite membranaceous, slightly emarginate on its middle, the emargination a little deeper on sixth.

Eye length less than twice upper interorbital distance, but almost twice lower interorbital distance (120:74:62 and maximum interorbital distance 96); interocellar distance a little longer than ocellorbital, and almost equal to transverse diameter of median ocellus (18:13:17); ocelloccipital distance longer than interocellar, and equal to ocelloccipital distance (22:18:22); clypeal length conspicuously longer than half clypeocellar distance (44:75); interalveolar distance a little longer than alveolorbital (18:15), and alveolocellar slightly shorter than subantennal suture (32:33). Antennae missing.

Type locality: Tefé (= Ega), Amazonas Brasil. (70/16)

3. *Megalopta ianthina* Smith, 1861

*Augochlora calliope* Cockerell, 1905, Entomologist, 38:37 (new synonym).

Type female, 17.a.1023. British Museum. Type female of *A. calliope* 17.a.1031, in the same Museum.

This species and the following one can be distinguished from any other *Megalopta* by having a relatively large head and small ocelli. Color separates *ianthina* from *nigrofemorata* at first sight.

Postocellar sulci very conspicuous. Punctures very small on the posterior disc of mesoscutum, interspaces polished and 7 to 10 times puncture diameter. Basal area of propodeum half length of metanotum with weak radiating rugulae all over its surface. Basitibial plate small, weakly margined; inner hind tibial spur pectinate with four spines.

Eye length almost equal to upper interorbital distance and shorter than lower interorbital distance (109:104:117 and maximum interorbital distance 125); interocellar distance less than ocellocular, but almost twice transverse diameter of median ocellus (23:29:12); ocelloccipital distance almost twice interocellar, but a little shorter than orbitooccipital distance (43:23:47); clypeus much shorter than half clypeocellar distance (32:85) and almost four times broader than long; interalveolar distance much

shorter than alveolorbital (23:38), but alveolocellar conspicuously longer than subantennal suture (43:30); proportional lengths of scape, pedicel and five basal segments of flagellum as 74:8:11:10:11:12:13 and maximum diameter 12.

Measurements of the same distances on the type of *calliope* demonstrate conspicuous allometry. They are as follows: Eye length, upper lower and maximum interorbital distances as 98:79:85 and 95; interocellar, ocellular and transverse diameter of median ocellus as 20:20:10, and vertex notably shorter than on type specimen of *ianthina* as shown by ocelloccipital and orbitooccipital distances respectively 25:27. Clypeal length and clypeo-cellular distance as 31:75, and clypeus only three times broader than long; interalveolar distance shorter than alveolorbital (17:25) and alveolocellar longer than subantennal suture (39:27); proportional lengths of scape, pedicel and four basal segments of flagellum as 60:8:10:8:10:11 and maximum diameter 11. Size: Length 9.8 mm.; wing, including tegula, 8.55 mm.; head and abdominal widths 3.04 mm. and 3.45 mm.

Type locality for both *ianthina* and *calliope*: Tefé (= Ega), Amazonas, Brasil. The specimen labelled *M. ianthina* is from Smith's collection, the other is numbered 58/6.

#### 4. *Megalopta nigrofemorata* Smith, 1879.

Type female: 17.a.1020. British Museum.

SIZE: Length 9.60 mm.; wing, including tegula, 8.80 mm.; head and abdominal widths 3.4 mm. and 3.68 mm.

Eye length exceeding upper interorbital distance, almost equal to lower one (100:88:95 and maximum interorbital distance 98); interocellar distance shorter than ocellular distance and a little less than twice transverse diameter of anterior ocellus (19:25:11); ocelloccipital distance shorter than orbitooccipital but conspicuously longer than interocellar distance (27:32:19); clypeus a little shorter than half clypeo-cellular distance (35:78), its width 2.6 times its length; interalveolar distance shorter than alveolorbital distance (20:29) and alveolocellar distance much longer than subantennal suture (42:28); proportional lengths of scape, pedicel and four basal segments of flagellum as 65:8:10:8:10:11.5 and maximum diameter of flagellum 11.5.

Radiating rugulae of basal area of propodeum weaker than in *ianthina*, and punctures of tergites shallower. Lateral corners of pronotum a little less produced.

Type locality: Tefé (= Ega), Amazonas, Brasil. (70/16).

#### **Megaloptodes** new genus

Type species: *Megalopta bituberculata* F. Smith, 1853.

The systematic relations of this species are not very evident. The supraclypeal area and, principally, the clypeus, are very

flat thus differing from other members of the *Megalopta* group. Even more distinctive is the lack of a pre-episternal sulcus on the mesepisternum. The pronotum is completely rounded all the way to the lobes without vestiges of the pronotal crest nor of the humeral angles. Although in *Megommation* and *Megaloptidia* the pronotum also lacks a crest, the humeral angles are clearly evident. This character is emphasized in *M. bituberculata* because the mesoscutum is truncate anteriorly and not arcuately procurved as in *Megalopta* and the groups mentioned above.

Another point that indicates separation from the Megaloptas is the aspect of the wing venation. The free apical part of the marginal cell in *Megaloptodes* is approximately equal to the basal part occupied by the submarginal cells, while in the Megaloptini (Moure, 1943) the free part is about twice as long as the part occupied by the submarginal cells.

Equally, the sterna without any modification and the last tergite which is truncate—bidentate are found exclusively in *Megaloptodes*, as are the two notable scutellar tubercles.

Knowledge of the female would clarify the position of the genus. Also, study of the genitalia might give indications of its relations. However, since the type is a unique and in none too good a state of preservation, I decided not to attempt a dissection.

MALE.—Punctures small and shallow. Without yellow marks and almost without metallic reflections. Tergites without basal or marginal bands of tomentous pubescence, or fringes of bristles.

a) Head moderate sized; face rather narrow; gena in profile narrower than eye and rounded.

b) Labrum rather short and broad (50:30), apex almost right angular, without median carina, and labral plate reduced to a vestigial rounded transverse basal carina. Labial palpi long, first segment as long as three following together; maxillary palpi a little longer than apical part of galea and this less than half length of eye (47:116). Mandibles mucronate, simple.

c) Clypeus flat, slightly broader than long (58:50), with a shallow median carina, projecting but little below lower orbital tangent, but surpassing and overhanging labro-clypeal articulation; lateral parts of epistomal suture diverging downwards and almost touching orbits. Supraclypeal area very weakly bowed, parallel-sided, almost twice as broad as paraocular area. Frons much shorter than clypeus and the frontal line shallowly sulcate, not carinate. Antennal alveoli closer to orbits than each to the other (15:22), placed on upper third of face, with alveolocellar

distance as long as subantennal suture (30:30). Malar area almost linear, one fortieth of eye length.

d) Eyes practically glabrous, large, slightly emarginate, converging in upper forth. Eye length almost twice upper interorbital distance and this slightly longer than lower interorbital distance (116:65:60 and maximum interorbital distance 83). Ocelli rather moderate sized, their diameters a little more than antennal alveolar diameters; interocellar distance longer than median ocellar diameter and twice ocellocular distance (22:15:10). Vertex short and rounded; postocellar sulci almost vestigial.

e) Scape longer than alveolocellar distance (45:30) or than pedicel and two basal flagellar segments together (45:8:13:20); second flagellar segment almost twice as long as its diameter; other segments missing.

f) Pronotum without crista and lateral laminae, rounded and just applied to mesoscutum, without humeral angles and without antero-lateral carinae. Mesoscutum not produced, truncate-rounded in front; median line, prescutal (notauli) and parapsidal sutures very shallow. Mesepisterna with preepisternal suture inconspicuous. Scutellum bituberculate, tubercles broad low cones.

g) Tegula of medium size, not dilated posteriorly. Pterostigma rather narrow (50:15), prestigma wide and short (12:10); marginal cell rather narrow (108:25) and distance from its apex to wing tip more than half length (108:74). Third submarginal cell longer than first, second the smallest, subquadrate, proportional lengths on M as 47:16:53; first m-cu in apical third of second submarginal cell, and second m-cu three tenths from apex of third submarginal cell (or 5 and 15 from apex respectively). Hamuli 11 per wing.

h) Legs normal. Proportional lengths of femur, tibia, and basitarsus of second pair as 80:62:61; of third pair as 100:106:83; no basitibial plate; a dense fringe of medium-sized hairs on distal half of inner side of middle tibia.

i) Propodeum short, bowed. Basal area very conspicuous and with some irregular rugae, limited by a sharp thin carina. Postero-lateral carinae very short, upper postero-lateral angles rounded.

j) Abdomen broad, sides subparallel; tergites with broad sub-membranous marginal depressions, wider on middle, rather narrow on first tergite. Seventh tergite broadly truncate, with a small tooth on each side. Six visible sternites, normal, neither emarginate or depressed; graduli present at least on second, third, and fourth sternites.

## 5. *Megaloptodes bituberculatus* (Smith, 1853) new combination *Megalopta bituberculata* Smith, 1853, Cat. Hym. Br. Mus., 1: 84

Type male: 17.a.1275. British Museum.

SIZE: Length 11.6 mm.; wing, including tegula, 9 mm.; head and abdominal widths 3.28 mm. and 3.65 mm.

Face and thorax rather densely plumoso-pubescent. Scutellum bituberculate, almost as in *Rhathymus*.

Type locality: Amazonas, Brasil. From the F. Smith collection.

6. *Neocorynura pilosa* (Smith, 1879)

*Megalopta pilosa* Smith, 1879, Descr. N. Sp. Hym., p. 48.

Type female: 17.a.1024. British Museum.

SIZE: Length 8.4 mm.; wing, including tegula, 7.4 mm.; head and abdominal widths 2.4 mm. and 2.7 mm.

Eye length much longer than upper interorbital distance, this longer than lower interorbital distance, but shorter than maximum interorbital distance at emargination (80:61:54:85); interocellar distance shorter than ocellocular, but larger than transverse diameter of median ocellus (13:18:9); ocelloccipital distance longer than interocellar but a little shorter than orbitoccipital (17:13:23). Clypeal length less than half clypeocellar distance (31:66), 1.7 times broader than long. Inter-alveolar distance a little less than alveolorbital (16:20), and alveolocellar slightly longer than subantennal suture (30:28). Proportional lengths of scape, pedicel, and four basal articles of flagellum as 54:8:8:6:9:10, maximum flagellar diameter 12.

Pronotum with humeral corners strongly salient. Mesoscutum strongly produced forward and bilobate. Metasoma moderately claviform. Color and pubescence as in Smith's description. Punctures on clypeus and supra-clypeal area larger than on frons, but smaller than on disc of first tergite, interspaces polished on apical half of clypeus and larger than punctures, of the same size and reticulate above, and duller on supra-clypeal area. On mesoscutum punctures very crowded and uniform, on scutellum finer and shallower with some large punctures scattered; on first tergite large and deep on disc, smaller and closer towards borders; on following tergites dense and small.

Type locality: São Paulo de Olivenca, Amazonas, Brasil (70/16).

In my collection is one specimen from Tingo Maria, Perú.

7. *Neocorynura cuprifrons* (Smith, 1879)

*Megalopta cuprifrons* Smith, 1879, Descr. N. Sp. Hym., p. 49.

Type female: 17.a.1025. British Museum.

SIZE: Length 8.8 mm.; wing, including tegula, 7.7 mm.; head and abdominal widths 2.6 mm. and 3.0 mm.

Pronotum with humeral angles and anterior part of mesoscutum as in *N. pilosa*. Inner hind tibial spur pectinate with 5-6 spines. Punctures very dense (interspaces cariniform) on frons, mesoscutum and mesepisterna; larger and sparser on clypeus and supra-clypeal area, interspaces as large as punctures, polished and shining; on scutellum a little smaller and sparser than on mesoscutum, with some larger punctures scattered; on propodeum punctures large as on clypeus, interspaces as large as punctures



and covered with very fine punctures; on first tergite deep and large on disc, sparser towards base, denser and smaller towards posterior margin and sides; on second tergite slightly smaller than on mesoscutum, deep and very crowded, on third and following tergites much smaller. Basal area of propodeum with numerous (24-26) regularly radiating striae, median ones with apices bifurcate.

Eye length longer than upper interorbital distance and this greater than lower interorbital distance, but maximum interorbital distance longer than eye (85:65:57:92). Interocellar distance shorter than ocellular, greater than transverse diameter of median ocellus (14:18:9); ocellocipital distance greater than interocellar distance but shorter than orbitocipital (19:14:25). Clypeal length half clypeocellar distance (34:67), 1.5 times as broad as long. Inter-alveolar distance shorter than alveolorbital (17:22) and alveolocellar distance (between closer borders of antennal sockets and median ocellus) longer than subantennal suture (32:28). Proportional lengths of scape, pedicel and four basal segments of flagellum as 57:8:7:8:9:10 and maximum diameter of flagellum 13.

Type locality: São Paulo de Olivença, Amazonas, Brasil (70/16).

8. *Augochloropsis* (*Augochloropsis*) *vivax* (Smith, 1879)

*Megalopta vivax* Smith, 1879, Descr. N. Sp. Hym., p. 48.

Type female: 17.a.1224. British Museum.

SIZE: Length 8.4 mm.; wing, including tegula, 6.26 mm.; head and abdominal widths 2.6 mm. and 2.8 mm.

Vertex rounded. Humeral corners of pronotum salient, with a small outer emargination; lateral carina expanded in a broad lamina with a small sinuosity a little before outer emargination, partially translucent and ending in an acute angle on lobes. Mesocutum broadly shining on disc (interspaces sometimes large as 5 diameters of punctures and with a shallow micro-tessellation), punctures denser toward sides and forward, and very crowded and coarse on anterior corners as on frons; rough and shallower on lower paracocular areas, much sparser on clypeus and supra-clypeal area (interspaces shining and 2 to 5 times broader than punctures), with some transverse rugae on upper half of supra-clypeal area; on mesepisterna deeper, on metepisterna finer and denser, also on proximal part of propodeum, but sparser backward and downwards; postero-lateral angles of propodeum broadly polished and posterior surface shining but with scattered deep punctures; moderately strong on sides of first and second tergites, shallower on discs and sparser toward bases; marginal depressions on first and second tergites smooth, on third and fourth with a median area finely and densely punctured, leaving a narrow smooth fascia on basal and marginal border of these depressions. Legs pale-brownish, with some green reflections on tibiae, conspicuous on anterior ones. Inner hind spur pectinate with six teeth, the spur broadened at base. Marginal pale fringes on first and second tergites very well developed, on first larger than marginal depression, on second a little shorter in middle and at extreme

sides, the two fringes of the same length (9) and uniform. Semierect black bristles on discs of tergites 2 to 5, most conspicuous on the third. Basal area of propodeum semilunar with strong uniform radiating striae (about 26).

Eye length longer than upper interorbital distance, and this longer than lower one, but maximum interorbital distance longer than eye length (81:75:63:90). Interocellar distance a little shorter than ocellocular, but longer than twice transverse diameter of median ocellus (20:23:9). Clypeal length half of clypeocellar distance (as measured between upper part of epistomal suture and lower border of median ocellus) (30:60). Inter-alveolar distance shorter than alveolorbital (19:21), but alveolocellar distance twice as long as subantennal suture (35:18). Proportional lengths of scape, pedicel and four basal segments of flagellum as 46:7:8:6:7:8 and maximum flagellar diameter 10. Frontal carina shorter than distance to median ocellus (18:23). Anterior edge of clypeus with a strong tooth on each side.

Type locality: Pará, Brasil. N. 70/16.

*A. atropos* is a very different species by having denser puncturation on mesoscutum, and interspaces two to three puncture diameters in width, reticulate and duller, pronotal corners obtuse without lateral notch, and vertex transversely roof-shaped.

#### **Augochloropsis (Glyptochlora) new subgenus**

Type species: *Megalopta ornata* Smith, 1879.

This subgenus has points of similarity to the subgenus *Glyptobasia*, which it resembles by the foveate puncturation (even coarser than in that subgenus) and by the form of the propodeum, whose lateral posterior carinae unite in a transverse carina closing the area of the propodeum posteriorly. In *Glyptobasia* the vertex is rounded and not roof-shaped, and the marginal depressions of the abdominal terga are normal and with fringes of coarse bristles on the first and second terga.

**FEMALE.**—Metallic; with very large and deep punctures on frons, thorax and propodeum, on mesoscutum and scutellum with diameters of 0.02 mm.; without marginal bristle-fringes ("vibrissae") on first and second tergites.

a) Head much as in *Augochloropsis* s. str., face between orbital sinuses broader than eye length (98:108); gena in profile as broad as eye, sharply margined.

b) Labrum elongato-cuspidate, its basal half occupied by a thick bituberculate labral plate, distal half membranous, subsemicircular, surmounted by a carina projecting beyond apex and on its borders with some short upturned bristles. Labial and maxillary palpi normal, short. Apical part of galea one fifth of eye length (100:20). Mandible bidentate, apical

tooth broad, inner one much smaller, a small emargination on inner margin, simulating a third tooth.

c) Clypeus and supraclypeal area bowed; clypeus projecting a little beyond lower orbital tangent, almost twice as broad as long; epistomal suture evenly bent and lower clypeal corner separated from orbit by half an ocellar diameter. Frons longer than clypeus (50:42), frontal line carinate on its distal half. Antennal alveoli slightly closer to each other than to orbits (22:25), placed almost on middle of face, and alveolocellar distance much longer than subantennal suture (37:24). Malar area linear.

d) Eyes glabrous, with inner sides sinuate. Ocelli normal, interocellar distance equal to ocellorbital, and about twice median ocellar diameter. Vertex sharply transversely roofed, posterior ocelli one diameter from crest of vertex, posterior surface steep and slightly concave; without postocellar sulci.

e) Scape very long (163), surpassing vertex; second flagellar segment a little shorter than third, but together longer than first (11:8:9:11 and diameter 14).

f) Pronotum with crista concave in middle, meeting at an obtuse angle the very broad straight lateral lamina, which ends in a right angle on pronotal lobe; antero-lateral carina present, beginning at dorso-lateral angles and going down. Mesoseutum produced forward in an up-turned, medially notched, lamina; median line and parapsidal sutures narrow, sharp and straight. Pre-episternal suture formed by a row of pits a little larger than punctures. Scutellum normal.

g) Tegula elongato-elliptic. Pterostigma almost four times longer than broad (50:13); prestigma twice as long as broad (15:7); marginal cell shortly appendiculate, a little less than four times its width (95:27) distance from its apex to wing tip more than two thirds of its length (95:70). First submarginal cell as long as second and third together (on marginal cell 54:17:37), second the smallest, subquadrate, receiving first m-cu at its end, and second m-cu one seventh of its length from apex of third. Hamuli 11 per wing.

h) Legs normal; second basitarsus slightly shorter than tibia (70:60); hind tibia much shorter than tarsal segments together, and basitarsus three fourths of tibial length (220:160:90); basitibial plate absent; inner hind spur pectinate, with 7 to 8 teeth; femoral scopa strongly developed, dense, tibial scopa short but dense.

i) Propodeum with its posterior face subquadrate, outlined by a strong sublaminar carina; horizontal area smooth, well developed, defined by strong upper and postero-lateral carinae and enclosing the basal semilunar area, slightly depressed, with a median strong carina and some weaker radiating ones (about 18).

j) Tergites 1 and 2 without marginal fringe of bristles; marginal depressions very wide and broadened medially, on third tergite occupying more than two thirds of exposed portion. First sternite strongly carinate on its basal third, and its margin slightly recurved; margin of second straight, of third to fifth broadly procurved; graduli present only on second and third sternites.

9. *Augochloropsis* (*Glyptochlora*) *ornata* (Smith, 1879)  
*Megalopta ornata* Smith, 1879, Descr. N. Sp. Hym., p. 49.  
Type female: 17.a.1274. British Museum.

SIZE: Length 10.0 mm.; wing, including tegula, 9.0 mm.; head and abdominal widths 3.12 mm. and 4.0 mm.

Type locality: São Paulo de Olivença, Amazonas, Brasil (70/16).

*Augochloropsis refulgens* (Smith, 1861) (Type ♀ 17.a.1245) [= *A. deidamia* Smith, 1879, type ♀ 17.a.1253] shares some characters with *A. ornata*, as the sharply roofed vertex, broadly expanded lateral lamina on pronotum, and lack of fringe of bristles on the first and second tergites, but the mesonotum, propodeum and marginal depressions are normal as in *Augochloropsis*.

*Augochloropsis atropos* (Smith, 1879) [Type ♀ 17.a.1254] is also closely related to *refulgens*, but has well developed marginal fringes on the first and second tergites.

(continued from page 178)

Treat began with an explanation of the lateral line sensory mechanism of fish. The lateral line enables fish to locate the source of moving objects which are not themselves in direct contact with the fish. From this type of hearing mechanism, two main lines of evolution, one for amphibians and another for reptiles, birds, and mammals, have evolved . . . in relation to the aquatic or terrestrial habitats.

Among insects, including most of the orthoptera, many hemiptera, and lepidoptera, the basic mechanisms of hearing are quite unlike those of any vertebrate. Insect tympanic organs are sensitive not to pressure changes as such, but to actual mechanical movements of the tympanic membrane, or, in other words, to the actual particles which move the membrane. Dr. Treat drew upon his own work on hearing in noctuid moths to explain some of the neurophysiological aspects of insect hearing. The noctuid moth has only 2 sense cells associated with the tympanic membrane. Although certain noctuid moths have a great range of frequency sensitivity, extending up to well over 100,000 cycles per second, they cannot discriminate different frequencies, and could never be "out of tune". The minimum energy necessary to excite the noctuid tympanic mechanism is roughly comparable to that in vertebrates—which is about the maximum sensitivity that could exist before simple Brownian movement of particles in the auditory mechanism would excite the sensory cells. Dr. Treat showed slides of the nerve impulse messages recorded from the sensory cells in the noctuid auditory organ.

(continued on page 222)